

CCR Number: 0020

CRITICALITY: ROUTINE

DUE 11/09/98

DISTRIBUTION SHEET  
EO-1 LEVEL II CCB

Matt Jurotich/EO-1 Payload Manager

Pete Spidaliere/EO-1 Mission Mgr

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Jeff Woytech/LeRec

PROGRAM <u>EO-1</u>		TITLE <u>CHANGES TO EO-1 SC TO PPT ICD-019</u>					
CCR NO. <u>0020</u>		ORIGINATOR <u>C.Zakrzwski</u>					
DATE INITIATED <u>11/09/98</u>		ORIGINATOR'S CHG. NO. _____					
		SPONSOR/CODE <u>Chuck Zakrzwski</u> PHONE <u>x3392</u>					
EFFECTIVITY  ITEM: <u>EO-1/PPT</u>  S / N _____  ITEM: _____  S / N _____  ITEM: _____  S / N _____		CHANGE CLASS		TYPE OF CHANGE			
		I II		MILESTONE <input type="checkbox"/> INTERFACE <input checked="" type="checkbox"/> SOFTWARE <input type="checkbox"/>			
		PRELIMINARY <input type="checkbox"/> <input type="checkbox"/>		DOCUMENT <input checked="" type="checkbox"/> POWER <input type="checkbox"/> OTHER <input type="checkbox"/>			
		FORMAL <input type="checkbox"/> <input type="checkbox"/>		COST <input type="checkbox"/> WEIGHT <input type="checkbox"/> _____			
		DOCUMENTS OR SOFTWARE AFFECTED <u>EO-1 ICD-019</u>					
PROBLEM  The attached Preliminary Interface Revision Notice (PIRN) contains changes to the Pulsed Plasma Thruster (PPT) Interface Control Document (ICD) 19. This PIRN includes suggested changes that will be incorporated as an Interface revision and will be officially documented as such. The PIRN will become an official Interface change once the EO-1 project Configuration Control Board (CCB) chairman signs this CCR and the attached PIRN.							
PROPOSED SOLUTION  Approve the attached PIRN 001 to EO-1 ICD-0019 by the EO-1 Level II Configuration Control Board (CCB). The signed PIRN will serve as the official approval of changes to this ICD. Future changes will be initiated by submittal of Configuration Change Requests (CCRs) and Preliminary Interface Revision Notices (PIRNs) for CCB approval. This document is maintained by the EO-1 Configuration Management Office (CMO).							
BOARD ACTION		APPROVAL LEVEL		CRITICALITY LEVEL		PROCUREMENT CHANGE ORDER CLASSIFICATION	
APPROVE <input checked="" type="checkbox"/>		REQUIRED LEVEL I HQS <input type="checkbox"/>		EMERGENCY <input type="checkbox"/>		ROUTINE	
APPROVE WITH CHANGE <input type="checkbox"/>		LEVEL II GSFC <input checked="" type="checkbox"/>		URGENT <input type="checkbox"/>		URGENT	
DISAPPROVE <input type="checkbox"/>		LEVEL III <input type="checkbox"/>		ROUTINE <input checked="" type="checkbox"/>		EMERGENCY <input type="checkbox"/>	
WITHDRAW <input type="checkbox"/>						OPTION 1 <input type="checkbox"/> OPTION 1 <input type="checkbox"/>	
						OPTION 2 <input type="checkbox"/> OPTION 2 <input type="checkbox"/>	
COMMENTS							
CHAIRPERSON <u>[Signature]</u> DATE <u>22 Dec 98</u>							

**GODDARD SPACE FLIGHT CENTER**

1. PAGE 1 OF 14

PRELIMINARY SPECIFICATION CHANGE NOTICE (PSCN) No. \_\_\_\_\_

2. INIT. DATE:  
11/03/98

or  
PRELIMINARY INTERFACE REVISION NOTICE (PIRN) No. 001

3. CONTRACT NUMBER

4. ASSOCIATED  
CONTROL NUMBERS: EO-1CCR 0020

5. CI'S AFFECTED:  
PPT ICD-019

6. DOCUMENT NUMBER:

7. DESCRIPTION OF CHANGE:

REVISION:

1. Section 2.1 Applicable Documents Add: The following: **GSFC-426-EO-001 Mission Assurance Document**

2. Section 3.2.4 Change

From : "... The alignment of the surface of the fuel ~~fuses~~ with respect to the holes will be measured to better than 0.5 deg."

To : "The alignment of the surface of the fuel **faces** with respect to the holes will be measured to better than 0.5 deg."

3. Section 3.2.7.1 Thermal Interfaces Change

From : "The maximum allowable heat flow from all sources in Table 3-5, and the spacecraft interface temperature limits during operational and nonoperational modes are shown in Table 3-6. The optical surface properties of the PPR are shown in Figure 3-5. The attachment point between the PPT and the spacecraft shall be consistent with Table 3-5.

To : "The thermal conductance between the spacecraft and the PPT shall not be greater than 0.22 W/C and the spacecraft interface temperatures shall not exceed the limits specified in Table 3-6. A monitorint point, defined in the PPT thermal data package, shall be within the limits specified in Table 3-6 A. The optical surface properties of the PPT are shown in Figure 3-5."

4. Delete Table 3-5.

5. Add the following Table 3-6 A:

PPT Thermal Monitoring Point Limits

	On-Orbit Survival	Thermal-Vacuum Test
Monitoring Point	-22 to 30 C	-32 to 42 C

6. Notes in Figure 3-5 PPT Optical Surface Properties

From : White Polyurethane:  $e = 0.9 \pm 0.05$ ,  $\theta = 0.3 \pm 0.04$   
Hom:  $e = 0.8$ ,  $\theta = 0.9$

To : White Polyurethane:  $e = 0.9 \pm 0.05$ , **absorptivity**  
Horn:  $e = 0.8$ , **absorptivity**

ORIGINATING ORGANIZATION APPROVAL:

ORGANIZATION:

PREPARED BY: S. Schneider/EO-1 CMO  
HST CCB ACTION

SIGNATURE: 

DATE: 22 Dec 98

APPROVED: ☒ DISAPPROVED:

7. Section 3.3.1.2 Table 3-7 Change From:

**Table 3-7. Power Requirements**

CATEGORY	PPT POWER
VOLTAGE RANGE	$28 \pm 6 \text{ V}$
MAXIMUM CURRENT	4 A

To:

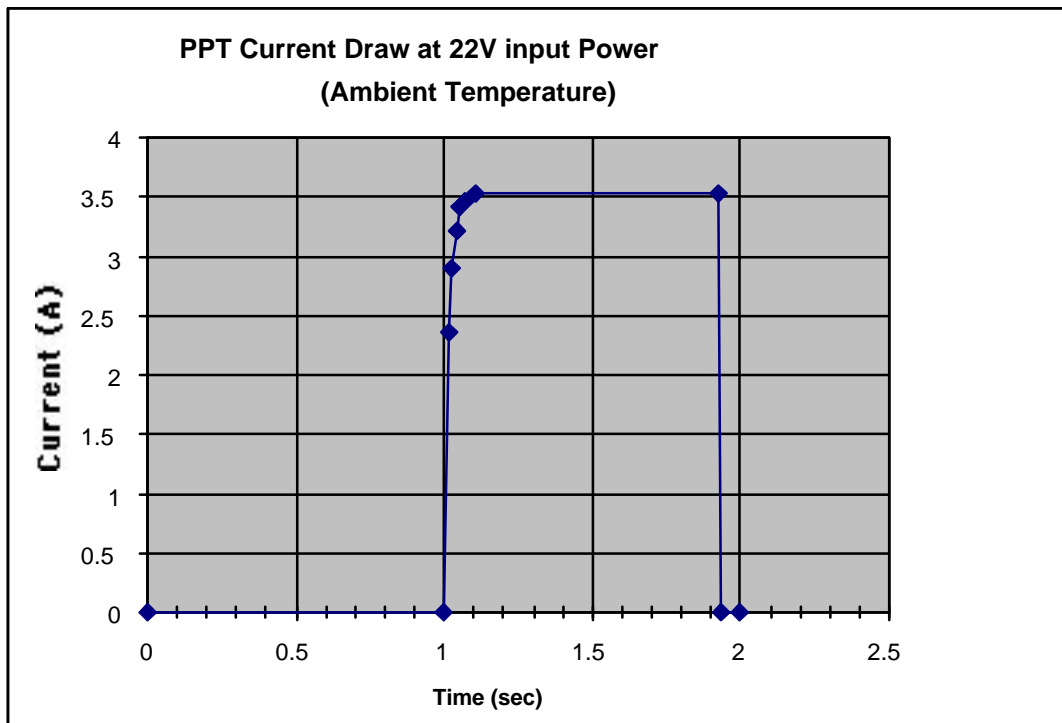
**Table 3-7. Power Requirements**

CATEGORY	PPT POWER
VOLTAGE RANGE	$28 \pm 6 \text{ V}$
MAXIMUM CURRENT	4.5 A

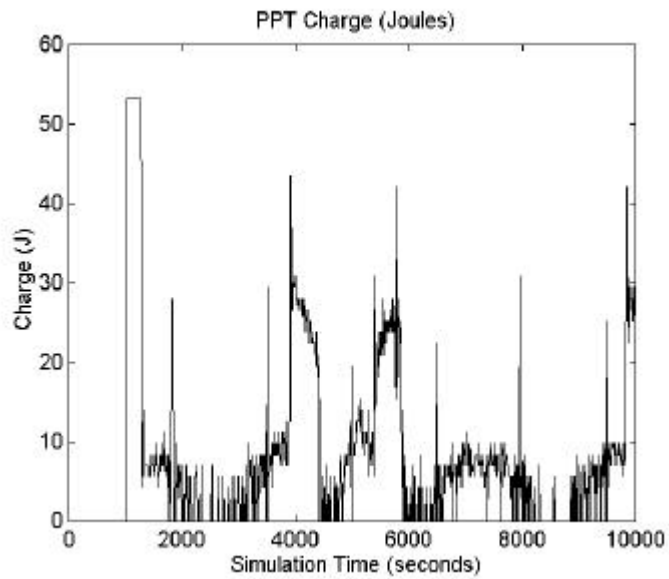
8. Section 3.3.1.3 Change From: “The PPT’s internal current-limiting circuit shall be designed such that the main capacitor is charged to 54 J when a 920-ms charge ...”

To: “The PPT’s internal current-limiting circuit shall be designed such that the main capacitor is charged to **60 J** when a 920-ms charge ...”

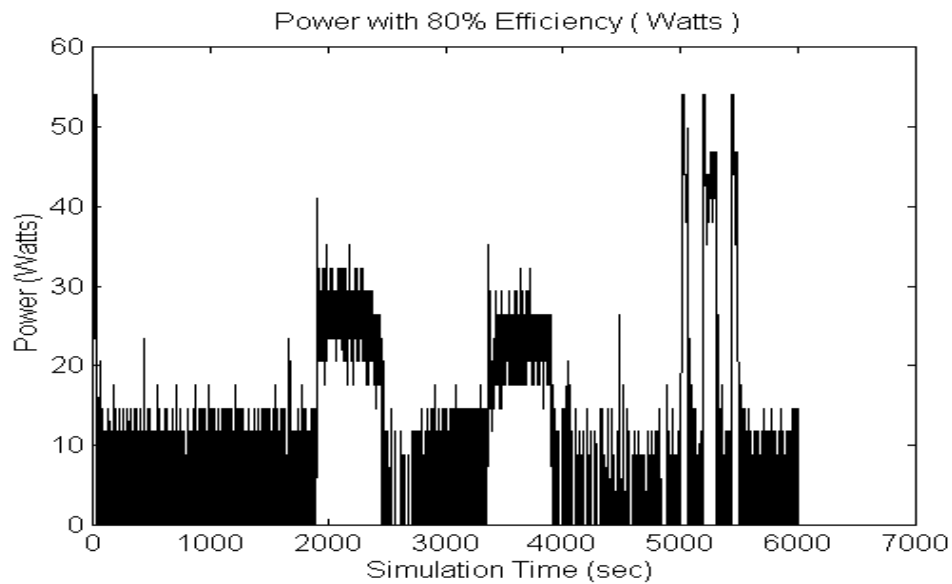
9. Add: The following Figure 3-7 Charging Current Profile



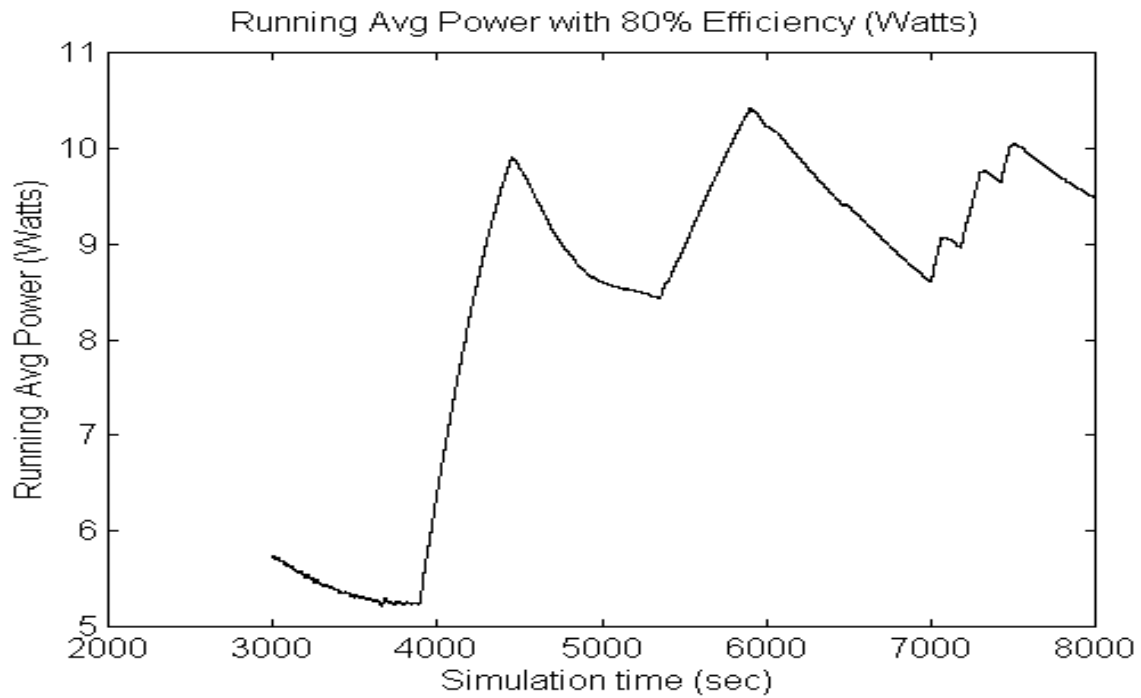
10. Change Figure 3-8 Nominal Operation Load Profile  
From:



To: Figure 3-8 A



11. Add: The following Figure 3-8 B

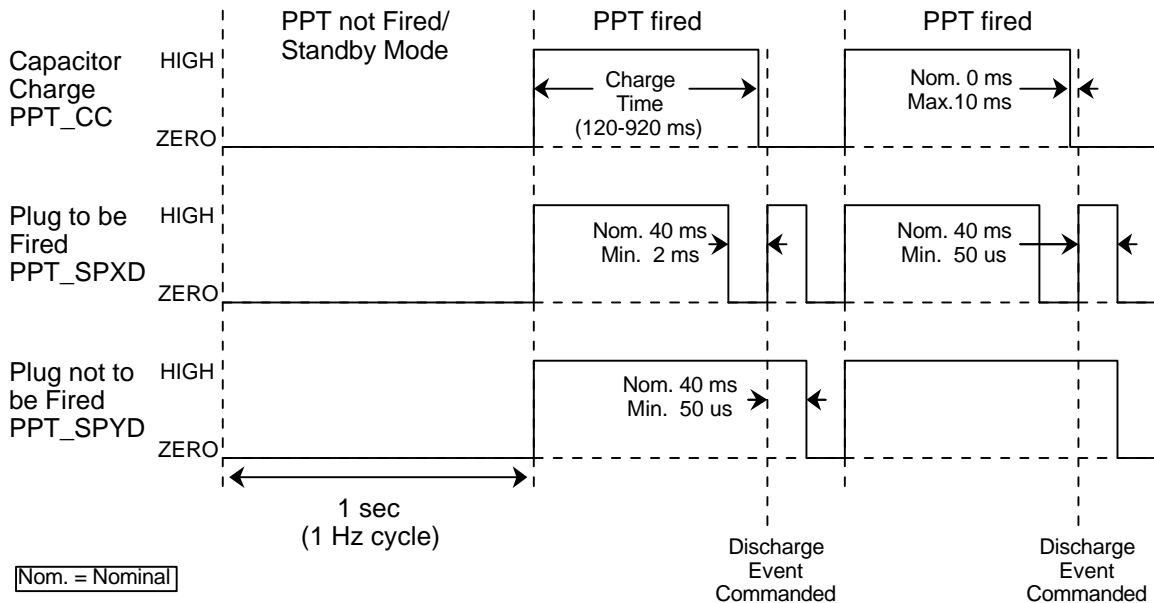


12. Change Section 3.3.2 Command Requirements

From: “The command requirements are listed in Table 3-9.”

To: “The **PPT** command sequence for the PPT is illustrated in Figure 3-9. A description of each command and a description of the electrical characteristics of all commands are given below.”

13.Add: The following Figure 3-9 Command Pulse Sequence



**Figure 3.9 Command Pulse Sequence**

14.Change Section 3.3.2.1 Capacitor Charge

From: “The PPT will charge the main capacitor for the length of time the capacitor charge signal is switched from a logic zero to the logic level high position.”

To: “The PPT will charge the main capacitor for the length of time the capacitor charge **command** signal is switched from a logic zero to the logic level high position. **per the command sequence constraints shown in the upper trace of Figure 3-9.**”

15. Change Section 3.3.2.2. Spark Plug Discharge

From: “The spark plug discharge signals will discharge the appropriate spark plug and cause the PPT to fire. The leading edge of high going pulse is used to fire the spark plugs within 3 msec of the pulse front. The up edge discharge signal should be sent to the PPT coincident with the down end of the capacitor charge signal to prevent capacitor bleed down.”

To: “A spark plug discharge **command** signal will discharge the **selected** spark plug and cause the PPT to fire **within 50 usec of the command transition from logic zero (low) to logic high per the command sequence constraints shown in the middle trace of Figure 3.9.** The spark plug discharge command for the side that is not to be fired will receive the command sequence per the constraints shown in the lower trace of Figure 3.9.”

16.Add: Section 3.3.2.3 Command Signal Electrical Characteristics

The open circuit voltage at the PPT interface of any of the three command lines with respect to the common command return shall not go below -1.5 V continuously.

The maximum open circuit voltage at the PPT interface of any of the three command lines with respect to the common command return shall not exceed 0.5 V for a logic “zero” command.

For a logic “high” command, the current supplied to any of the three PPT command circuits shall be at least 7 mA current at a nominal voltage of 1.4 V at the PPT interface between the command line and the common command return.

The current supplied to any of the three-PPT command circuits shall not exceed 30 mA for any voltage at the PPT interface.

17.Change Section 3.3.3 Telemetry Requirements

From:

3.3.3 TELEMETRY REQUIREMENTS

THE TELEMETRY REQUIREMENTS ARE LISTED IN TABLE 3-10.

**TABLE 3-10. TELEMETRY REQUIREMENTS**

	TYPE OF SIGNAL	VOLTAGE	CURRENT
CAPACITOR VOLTAGE	<del>a</del> analog voltage output from PPT <u>with 1 K<math>\Omega</math> impedance</u>	0-5 V	<u>5 MA AT 5 V</u>
SPARK PLUG 1 VOLTAGE	<u>ANALOG VOLTAGE OUTPUT FROM PPT WITH 1 K<math>\Omega</math> IMPEDANCE</u>	0-5 V	<u>5 MA AT 5 V</u>
SPARK PLUG 2 VOLTAGE	<u>ANALOG VOLTAGE OUTPUT FROM PPT WITH 1 K<math>\Omega</math> IMPEDANCE</u>	0-5 V	<u>5 MA AT 5 V</u>
CAPACITOR TEMPERATURE	CURRENT SOURCE PROVIDE BY SPACECRAFT; IMPEDANCE AS A FUNCTION OF TEMPERATURE	—	—
<u>TRANSFORMER</u> TEMPERATURE	CURRENT SOURCE PROVIDE BY SPACECRAFT; IMPEDANCE AS A FUNCTION OF TEMPERATURE	—	—
FUEL GAUGE #1 VOLTAGE	CURRENT SOURCE PROVIDED BY SPACECRAFT; IMPEDANCE AS A FUNCTION OF GAUGE POSITION	—	—
FUEL GAUGE #2 VOLTAGE	CURRENT SOURCE PROVIDED BY SPACECRAFT; IMPEDANCE AS A FUNCTION OF GAUGE POSITION	—	—

Additional information is provided in Section 3.5.1.

To:

Table 3-10 Telemetry Requirements

Parameter	Type of Signal	Voltage	Current
Capacitor Voltage	Analog voltage output from PPT with 1Kohm impedance	<b>0 – 4.5V</b>	5mA @ 5V
Spark plug 1 voltage	Analog voltage output from PPT with 1Kohm impedance	<b>0 – 6.0V</b>	5mA @ 5V
Spark plug 2 voltage	Analog voltage output from PPT with 1Kohm impedance	<b>0 – 6.0V</b>	5mA @ 5V
		<b>Impedance</b>	
Capacitor Temperature	Current source provided by spacecraft impedance as a function of temperature	<b>(YSI #44906)</b>	
Transformer temperature	Current source provided by spacecraft impedance as a function of temperature	<b>(YSI #44906)</b>	
Fuel gauge #1 voltage	Current source provided by spacecraft; impedance as a function of gauge position	<b>2.21 – 5.05 kOhm</b>	
Fuel gauge #2 voltage	Current source provided by spacecraft; impedance as a function of gauge position	<b>2.21 – 5.05 kOhm</b>	

19.~~Delete~~ the following from Section 3.3.5.1.1 Conducted Emissions “. . . with the following exceptions: TBD.”

20.~~Delete~~ the following from Section 3.3.5.1.2 Conducted Susceptibility

Step voltages	+6 or - 6 V steps with 300 $\mu$ s rise time (0 to 100 percent) at a repetition rate up to 20 Hz.
Common mode voltages	-14 k $\Omega$ , zero-to-peak, 10 $\mu$ s width, at any repetition rate up to 300Hz

21.~~Delete~~ the following from Section 3.3.5.1.3 Radiated Emissions “. . . with the following exceptions: TBD.”

22.Change Table 3-13 Telemetry Requirements

From:

Table 3-13. Telemetry Requirements

	SIZE	RAT E	SOUR CE	ENGINEERI NG UNITS	RANG E	<u>Note</u>
CAPACITOR VOLTAGE	12 BITS	5Hz	PIO	VOLTS	TBD	<a href="#">1</a>
SPARK PLUG #1 VOLTAGE	12 BITS	<a href="#">1</a> HZ	PIO	VOLTS	TBD	<a href="#">2</a>
SPARK PLUG #2 VOLTAGE	12 BITS	<a href="#">1</a> HZ	PIO	VOLTS	TBD	<a href="#">2</a>
CAPACITOR TEMPERATURE	12 BITS	<a href="#">1</a> HZ	PIO	°C	TBD	
ELECTRODE TEMPERATURE	12 BITS	<a href="#">1</a> HZ	PIO	°C	TBD	
FUEL GAUGE #1	12 BITS	<a href="#">1</a> HZ	PIO	MM	TBD	
FUEL GAUGE #2	12 BITS	<a href="#">1</a> HZ	PIO	MM	TBD	
PPT POWER	1 BIT	<a href="#">1</a> HZ	PIO	ON/OFF	NA	
PIO VOLTAGE	12 BITS	<a href="#">1</a> HZ	PIO	VOLTS	0-40	
REQUIRED PPT PULSE	12 BIT	<a href="#">1</a> HZ	ACS	#1/#2 SEC	TBD	
COMMANDED PPT <a href="#">CHARGE</a> <a href="#">TIMEPULSE</a>	12 BIT	<a href="#">1</a> HZ	ACS	#1/#2 SEC	TBD	
<a href="#">DISCHARGE SPARK PLUG #1</a> <a href="#">COMMAND</a>		<a href="#">1</a> <a href="#">HZ</a>	<a href="#">ACS</a>			
<a href="#">DISCHARGE SPARK PLUG #2</a> <a href="#">COMMAND</a>		<a href="#">1</a> <a href="#">HZ</a>	<a href="#">ACS</a>			
<a href="#">TOTAL # OF SPARK PLUG # 1</a> <a href="#">DISCHARGES</a>		<a href="#">1</a> <a href="#">HZ</a>	<a href="#">ACS</a>			
<a href="#">TOTAL # OF SPARK PLUG #2</a> <a href="#">DISCHARGES</a>		<a href="#">1</a> <a href="#">HZ</a>	<a href="#">ACS</a>			
CUMULATIVE CHARGE TIME	12 BIT	2 HZ	ACS	SEC	TBD	

NOTES:  
immediately

1. [The spacecraft will capture the capacitor voltage during the charge interval](#)  
[prior to the fire command and immediately after the discharge command.](#)
2. [The spacecraft will capture the spark plug voltage during the charge interval](#)  
[immediately prior to the fire command.](#)

To:

Table 3-13 Telemetry Requirements

	Size (bits)	Rate (Hz)	Source	Engineering Units	Measured Range	Note
Parameters from PPT						
Capacitor voltage	10	5	PIO	0-1809 Volts	0 – 4.5 V	1
Spark plug #1 voltage	10	1	PIO	0-954 Volts	0 - 6.0V	2
Spark plug #2 voltage	10	1	PIO	0-954 Volts	0 – 6.0 V	2
Capacitor temperature	10	1	PIO	-45 – 65 °C	Non-linear	3
Transformer temperature	10	1	PIO	-45 -100 °C	Non-linear	3
Fuel gauge #1	10	1	PIO	0 – 25.0 mm	2210 – 5050 Ohm	4
Fuel gauge #2	10	1	PIO	0 – 25.0 mm	2210-5050_____	4
Parameters from s/c_____						
PPT power status	1	1	PIO	On/Off	----	----
PIO voltage	10	1	PIO	volts	----	----
Required PPT pulse	10	1	ACS	#1/#2 sec	----	----
Commanded PPT charge time	10	1	ACS	#1/#2 sec	----	----
Discharge spark plug #1 command	10	1	ACS	Fire/nofire	----	----
Discharge spark plug #2 command	10	1	ACS	Fire/nofire	----	----
Total # of spark plug #1 discharges	10	1	ACS	counts	----	----
Total # of spark plug #2 discharges	10	1	ACS	counts	----	----
Cumulative charge time	10	2	ACS	sec	----	----

Notes 1: The spacecraft will capture the capacitor voltage during the charge interval immediately prior to the fire command and immediately after the discharge command

2: The spacecraft will capture the spark plug voltage during the charge interval immediately prior to the fire command

3: GSFC s-311-P-18, Thermistor model #44906

4: Range is slightly beyond limit for fuel gauge, but PPT has additional fuel beyond the limit for fuel gauge.

### 23.Change Section 3.5.2 Ground Commands

From:

Command	Destination	Comments
Power PPT ON	TBD	
Power PPT OFF	TBD	

To:

Command	Destination	Comments
Power PPT ON	<b>0 - 920 msec</b>	
Power PPT OFF	<b>0-920 msec</b>	

24.Change Section 3.3.5.3 Isolation

From: "The main discharge capacitor and the electrode/stripline assemblies returns will be electrically isolated from the spacecraft with at least 300 Ohm impedance.

To: "The main discharge capacitor and the electrode/stripline assemblies returns will be electrically isolated from the spacecraft with at least ~~300~~ **1500 Ohm +/- 1 2% DC. Ohm-impedance**

25.Add: The following to Section 4 GSE:

**d. Hardware to enable the safe discharge of th PPT in ambient conditions when integrated to the spacecraft.**

**e. Shorting plug for the PPT to prevent inadvertent charging of the PPT.**

**f. Electrical breakout boxes to connect to each of the two PPT harnesses.**

**g. A contamination control bag which will allow for the discharge of the PPT during spacecraft thermal vacuum testing while preventing condensable contamination from being exhausted into the vacuum chamber.**

26.Change Section 5 Deliverable List

From:

The PPT supplier will provide the following items to the spacecraft vendor:

ITEM NO.	ITEM	DELIVERY DATE
1	<u>FLIGHT PPT UNIT</u> WITH MATING HARNESSSED TO SPACECRAFT PANEL FEED BULKHEAD CONNECTORS	15 JUNE 99
2	<u>TWO ELECTRODE SHORTING PLUGS TO ENABLE SAFE DISCHARGE OF PPT IN AMBIENT CONDITIONS</u>	15 JUNE 99
3	<u>TWO ELECTRODE COVERS</u> , IF REQUIRED	15 JUNE 99
4	<u>EACH OF THE TWO SPACECRAFT BULKHEAD CONNECTORS WITH BACKSHELLS</u>	15 FEB 98
5	<u>A BREAK-OUT BOX FOR EACH OF THE TWO PPT CONNECTORS</u>	15 FEB 98
6	<u>CONNECTOR SAVERS FOR THE PPT AND SPACECRAFT BULKHEAD CONNECTORS</u>	15 FEB 98
7	<u>CONNECTOR CAPS FOR THE PPT AND SPACECRAFT BULKHEAD CONNECTORS</u>	15 FEB 98
8	<u>A TRANSPORTATION BOX/HANDLING FIXTURE FOR THE PPT</u>	15 FEB 98
9	<u>PPT USER'S MANUAL</u> WITH SAFETY ANALYSIS	15 FEB 98
10	<u>ACCEPTANCE TEST DATA PACKAGE</u>	15 FEB 98

11	<a href="#">MECHANICAL ANALYSIS PACKAGE</a>	15 FEB 98
12	<a href="#">THERMAL MODEL AND ANALYSIS PACKAGE</a>	15 FEB 98
13	PPT FUNCTIONAL TEST PROCEDURE AND PPT INTEGRATION & TEST ASSY PROCEDURE	15 APR 98

[THE SPACECRAFT VENDOR WILL DELIVER THE FOLLOWING ITEMS TO THE PPT SUPPLIER:](#)

ITEM NO.	ITEM	DELIVERY DATE
1	<a href="#">ALL REFERENCE AND APPLICABLE DOCUMENTS SPECIFIED IN THE ICD</a>	1 FEB 98
2	PPT-TO-SPACECRAFT GROUNDING STRAP	15 JUNE 98
3	THERMAL ISOLATORS	1 FEB 98

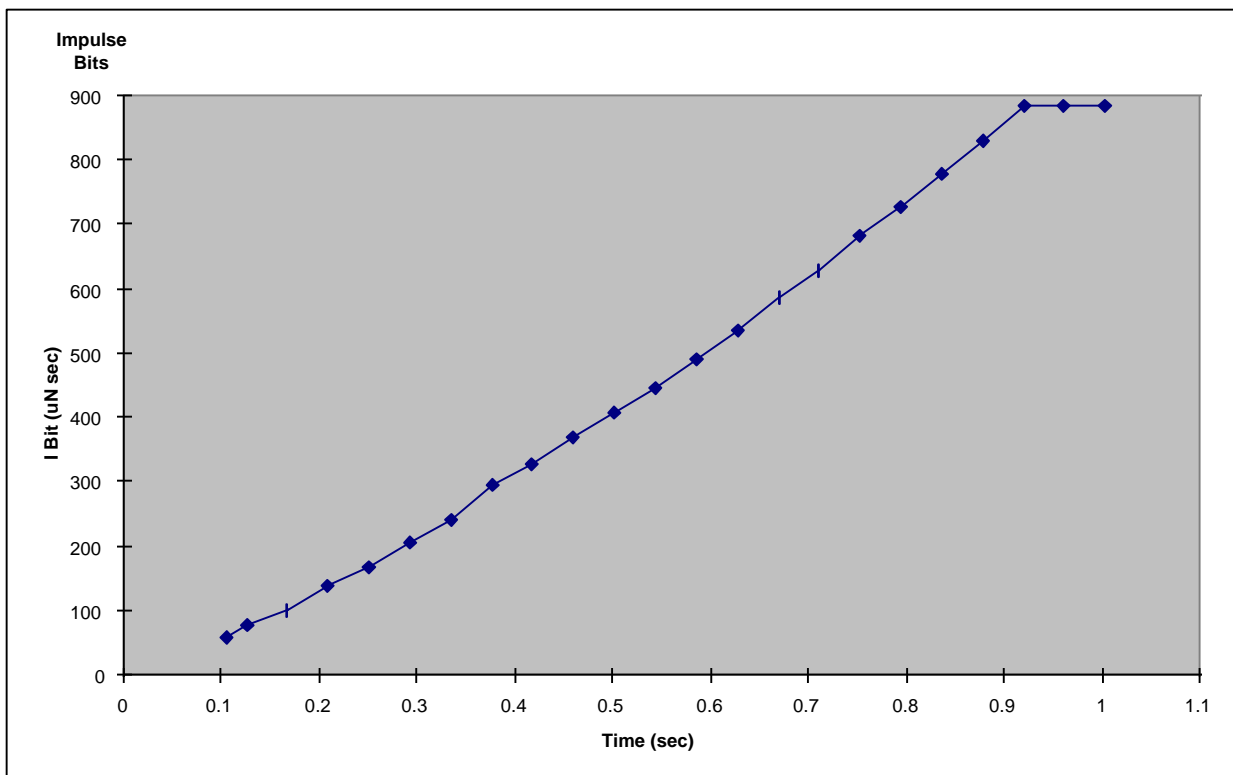
To:

Item No.	Item	Deliver Date
1	Flight PPT unit	4 Sept 99
2	GSE to enable safe charge and discharge of PPT while command through s/c	4 Sept 99
3	Safety Shorting plug for electrodes	4 Sept
4	Each of the two spacecraft bulkhead connector with backshells	15 June 99
5	A break-out box for each of the two PPT connectors	4 Sept
6	Connector savers for the PPT and spacecraft bulkhead connectors	4 Sept
7	Connector caps for the PPT and spacecraft bulkhead connectors	4 Sept
8	Handling/transportation fixture for PPT	4 Sept
9	PPT User's Manual with safety analysis	
10	Acceptance Test Data Package	10 Sept
11	Mechanical Analysis Package	4 Sept
12	Thermal Model and Analysis Package	4 Sept
13	PPT Functional Test Procedure and PPT Integration and Test Procedure	14 Sept

27.Change Section 6.1 Impulse Bits

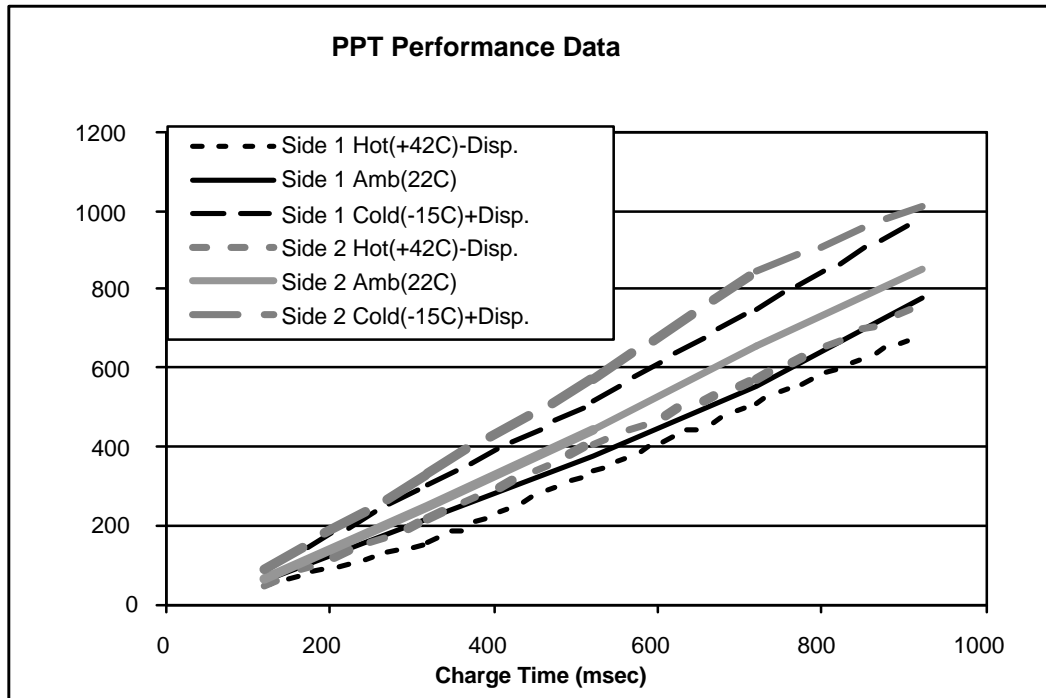
From:

[THE NOMINAL IMPULSE BIT PRODUCED BY THE PPT AS A FUNCTION OF COMMANDED CHARGE TIME FOR AN INPUT -VOLTAGE OF 28 V IS GIVEN IN FIGURE 6-1. THE ACTUAL IMPULSE BIT PRODUCED BY THE PPT WILL BE WITHIN  \$\pm 15\$  PERCENT OF THE NOMINAL RANGE FOR ALL INPUT VOLTAGES. THE PPT WILL PROVIDE ACCEPTANCE DATA AS VALIDATION OF THE PPT'S IMPULSE BIT- PERFORMANCE.](#)



To:

The nominal impulse bit produced **by each of the two PPT electrodes** as a function of commanded charge time for an input voltage of 28 V is given in **Figure 6-1, the graph below**. The impulse bit varies with temperature for a given charge time. (Note: The temperatures shown are not on-orbit predictions of high, low, and nominal) The added dispersions to the high and low cases shown are half the peak to peak shot-to-shot variations. The graphs are constructed from the data listed in the following table.



charge time	Side 1 Hot (+42C)-Disp.	Side 1 Amb (22C)	Side 1 Cold (-15C)+Disp.	Side 2 Hot (+42C)-Disp.	Side 2 Amb (22C)	Side 2 Cold (-15C)+Disp.
120	50	59	85	50	65	90
320	160	218	305	220	251	335
520	340	374	520	410	448	575
720	515	558	755	575	657	845
920	685	778	980	765	859	1015

28.Change Section 6.2 Thrust Vector

From: "... TBD deg. ..."

To: "... 5.5 deg. ..."

29.Change Section 6.3 Operational Constraints

From: "... 50 ms. ..."

To: "... 160 ms. ..."

30.Change Section 6.4 Total Impulse

From: “The total impulse capability of each of the PPT electrodes will be at least TBD ns.”

To:

6.4 **Operational Capability**

**Under nominal operations, defined by spacecraft attitude control system analyses, the PPT fuel mass shall provide a minimum of 30 days of continuous on-orbit operational control.**

Date: Tue, 10 Nov 1998 08:40:45 -0500 (Eastern Standard Time)  
From: Administrator <administrator@hst-nic.hst.nasa.gov>  
Reply-to: (Matt Jurotich)  
Subject: CCR:0020 - DUE: 11/30/98 ROUTINE Level-2 Matt Jurotic WWW-COMMENTS

USER : (Matt Jurotich) sent the following comments on :

-----  
Date: 11/10/98

CCR Number: 0020

Sponsor: Chuck Zakrzewski

Due Date: 11/30/98  
-----

CCR Title: CHANGES TO EO-1 SC TO PPT ICD-019  
-----

Remote host: 128.183.213.58 Email Address:  
-----

APPROVAL STATUS: APPROVED

Note:  
-----

COMMENTS:

Date: Tue, 22 Dec 1998 08:58:19 -0500 (Eastern Standard Time)  
From: Administrator <administrator@hst-nic.hst.nasa.gov>  
Reply-to: (Mark Perry)  
Subject: CCR:0020 - DUE: 11/30/98 ROUTINE  
Level-2  
Mark Perr WWW-COMMENTS

USER : (Mark Perry) sent the following comments on :

-----  
Date: 22 Dec 98  
CCR Number: 0020  
Sponsor: Chuck Zakrzwski  
Due Date: 11/30/98  
-----

CCR Title: CHANGES TO EO-1 SC TO PPT ICD-019  
-----

Remote host: 209.49.96.12 Email Address:  
-----

APPROVAL STATUS: APPROVED  
Note:  
-----

COMMENTS:

CCR SPONSOR RECOMMENDATION FORM

CCR NUMBER: 0020

CCR TITLE: Changes to SC to PPT ICD-19

CCR SPONSOR: Chuck Zakrzwski/GSFC

SUMMARY OF COMMENTS RECEIVED: (list Level 4 CCB and internal reviewers who had comments and address those comments)

No comments received.

Sponsor Recommendation: Approve as written.

SPONSOR/ORGANIZATION: Chuck Zakrzwski

DATE: 12/03/98